



# UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE  
United States Patent and Trademark Office  
Address: COMMISSIONER FOR PATENTS  
P.O. Box 1450  
Alexandria, Virginia 22313-1450  
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/626,880	07/25/2003	Susan Davis Allen	ASU-0001	1046
34610 KED & ASSOCIATES, LLP P.O. Box 221200 Chantilly, VA 20153-1200	7590 05/03/2007		EXAMINER KORNAKOV, MIKHAIL	
			ART UNIT 1746	PAPER NUMBER
			MAIL DATE 05/03/2007	DELIVERY MODE PAPER

**Please find below and/or attached an Office communication concerning this application or proceeding.**

The time period for reply, if any, is set in the attached communication.

## Office Action Summary

Application No.

10/626,880

Applicant(s)

ALLEN ET AL.

Examiner

Michael Kornakov

Art Unit

1746

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

### Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

### Status

- 1) ☒ Responsive to communication(s) filed on 05 February 2007.
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

### Disposition of Claims

- 4) ☒ Claim(s) 1-22 is/are pending in the application.
- 4a) Of the above claim(s) 21 and 22 is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☐ Claim(s) 1-20 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

### Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

### Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

### Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)  | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)   | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date <u>4/28/04, 12/21/05</u> | 6) <input type="checkbox"/> Other: _____  |

### **DETAILED ACTION**

1. Applicant's election with traverse of claims 1-20 in the reply filed on 02/05/2007 is acknowledged. The traversal is only for the election of species, however, the Examiner herein removes the election of species requirement. With regard to the restriction between method and apparatus claims, the Applicant has failed to point out wherein either (1) the reasons advanced by the Examiner to establish distinctiveness between the inventions as claimed and grouped or (2) the evidence of separate status, classification and/or search are in error. Therefore the restriction requirement is made **FINAL**.

2. Claims 1-20 are examined on the merits. Claims 21, 22 are withdrawn from consideration.

### ***Specification***

3. The incorporation of essential material in the specification by reference to an unpublished U.S. application, foreign application or patent, or to a publication is improper. Applicant is required to amend the disclosure to include the material incorporated by reference, if the material is relied upon to overcome any objection, rejection, or other requirement imposed by the Office. The amendment must be accompanied by a statement executed by the applicant, or a practitioner representing the applicant, stating that the material being inserted is the material previously incorporated by reference and that the amendment contains no new matter, see

Art Unit: 1746

37 CFR 1.57(f). Such incorporation is noted at least on pages 32, 33 and 40 of the instant specification.

***Claim Rejections - 35 USC § 102***

4. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless -

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

5. Claims 1, 5-10, 12-15, 17 are rejected under 35 U.S.C. 102(b) as being anticipated by Allen (U.S. 4,987,286).

Allen discloses a method for removing minute particles (as small as submicron) from a surface to which they are adhered. An energy transfer medium is interposed between each particle to be removed and the surface to which the particles are adhered. (abstract). Since the transfer medium can be water, any other liquid or solid or gas, (see col.2, lines 25-29), then such particle would be inherently surrounded by a transfer medium as well. The medium is an irradiated with pulsed laser energy at a wavelength which is strongly absorbed by the medium.(abstract, col.6, lines 40-45), all the parameters of the process, including the thickness of the transfer medium are selected so as to overcome Van der Waals, electrostatic, capillary and other forces holding particles on the surface and to dislodge the particles from substrate (abstract,

Art Unit: 1746

paragraph bridging col.2 and 3, Fig.2, lines 53-60). The medium absorbs sufficient energy to cause **explosive evaporation** with sufficient force to dislodge the particles (abstract). Since the pulsed energy applied in Allen is the same as the pulsed energy of the instant invention, and the nature and diameter of particles to be removed are substantially identical in Allen and in the instant invention, then the pulsed energy will cause the same result with regard to its action on the substrate and on the particle, such as expansion of the particle and expansion of the substrate.

6. Claim 11 is rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,987,286 in view of US 20020029956 to Allen.

US'286 does not specify that the transfer medium is alcohol, however, allows any suitable liquids for such purpose (see col. 3, lines 10-30). US' 956 in [0044] recognizes equivalent use of water, and water/alcohol mixtures as ETM used in LAPR. In [0088] it is stated that water or water/alcohol mixtures may be used with non-absorbing pulsed lasers, thus providing motivation and rationale for those skilled in the art to use the alcohol with the reasonable expectation of success as ETM.

7. Claims 2, 3, 4, 16, 18, 19, 20 rejected under 35 U.S.C. 103(a) as being unpatentable over US 4,987, 286 in view of .Tam et al (J. Appl. Phys., Vol. 71, No. 7, 1 April 1992).

US'286 discloses the process substantially as claimed as discussed above, however does not disclose specific relations between the diameter of the particle and the

Art Unit: 1746

thickness of ETM, as claimed. However, in col.5, lines 25-35, US'286 provides an embodiment to remove particle with the predetermined diameter of 1micron (line 32 of col.5), i.e. having a radius of 0.5 micron.

Tam teaches laser cleaning techniques, utilized in semiconductor industry for the removal of sub-micron size particles from semiconductor surfaces. The teaching of Tar includes selecting an optical radiation source, such as KrF or YAG lasers, having an optical energy distribution; determining a composition (water of alcohol or their mixtures with defined thickness (a few microns, page 3519, left column) and geometry (a film, page 3519, left column) to serve as an energy transfer medium for said optical radiate of source having said optical energy distribution; determining an optical pulse of said optical radiation source, while employing the said energy transfer medium and irradiating particles deposited on the sample surface by transferring energy from the optical radiation source through the energy transfer medium, thus dislodging the particles from the surface. Since Tam and US'286 disclose substantially identical process using identical lasers and identical ETM, one skilled in the art would have found obvious to find a proper ratio between the thickness of ETM (as taught by Tam) and the radius of the particle in the teaching of US'286 in order to ensure the optimal absorbance of the ETM and thus optimal dislogging rate for contaminant particles.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Mikhail Kornakov whose telephone number is (571) 272-1303. The examiner can normally be reached on 9:00 - 5:30.

Art Unit: 1746

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael Barr can be reached on (571) 272-1404. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.



Mikhail Kornakov  
Primary Examiner  
Art Unit 1746

04/29/07